



WASTE MANAGEMENT
DIVISION

OCT 1 10 09 AM '96

30 September 1996

Mr. Andrew Shively
VT Dept. of Environmental Conservation
Waste Management Division
103 South Main Street / West Building
Waterbury, VT 05671-0404

96-2030

Re: Goss Leasing Corporation Property, St. Johnsbury, Vermont

Dear Mr. Shively:

Enclosed please find one bound copy of Initial Site Investigation conducted at the above-referenced property. The investigation was prompted by evidence of a subsurface release of contamination from abandoned underground petroleum storage tanks.

If you have any questions regarding report content, please contact the office at 860-6065.

Sincerely,

Bruce Hamilton

Bruce Hamilton
Environmental Engineer

enclosures

cc: Mr. Henry Goss, Goss Leasing Corp.

Ref: 96048L03.doc

UNCLASSIFIED
DATE 01-10-96 BY 1041

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INITIAL SITE INVESTIGATION REPORT

**Goss Leasing Corp.
St. Johnsbury, Vermont**

20 August 1996

Prepared for:

**Henry Goss
Goss Leasing Corporation
36 Covington Lane
Shelburne, VT 05482
Phone: 802-660-3412**

Prepared by:

**Ground Water of Vermont
1 Mill Street, Box C-5
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GWV Project #V96-048

Ref. 96048R02.DOC

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EXECUTIVE SUMMARY

Ground Water of Vermont (GWV) has conducted an initial site investigation of subsurface petroleum contamination at the Goss Leasing Corp. complex on Summer Street in St. Johnsbury, Vermont. Field investigations following removal of three abandoned gasoline underground storage tanks (USTs) included the installation of four monitoring wells, field screening of subsurface soils for the presence of volatile organic compounds (VOCs), sampling and analysis of ground water from the four monitoring wells, and a site survey for the purposes of identifying and assessing potential risks to the environment and human health.

This Initial Site Investigation Report presents the results of this investigation, as well as GWV's conclusions and recommendations. GWV's conclusions are summarized as follows:

1. Gasoline has been released to soil and ground water around the former USTs. The former USTs appear to be the only contaminant source.
2. The absence of the gasoline additive MTBE in the monitoring wells suggests that the gasoline releases were not recent.
3. The downgradient extent of ground-water contamination has not been determined. Vermont Groundwater Enforcement Standards were significantly exceeded for all BTEX compounds in the farthest directly-downgradient monitoring well (MW-2).
4. Surficial materials at the site generally consist of six to 15 feet of sand or sand and gravel, underlain by damp, gray clay. Ground water was present during the 9 July 1996 sampling event at depths ranging from 7 to 15 feet below ground surface, and was flowing east at an average gradient of approximately 17%.
5. The residual contamination in soil and ground water does not appear to pose an imminent threat to the environment or human health.

On the basis of these conclusions, GWV recommends the following:

1. One additional monitoring well should be installed along the eastern edge of the on-site building (near the Methodist church), in order to determine the downgradient extent of subsurface contamination.
2. Contaminant concentrations and ground-water elevations in the four existing on-site wells and the additional proposed well should be monitored quarterly for one year, in order to evaluate seasonal fluctuations in water levels and in water quality.
3. The results of the first year's quarterly monitoring program should be used to evaluate the need for additional investigation and/or continued ground-water monitoring at the site.

1.0 INTRODUCTION

This report details the results of an initial site investigation conducted at the Goss Co., Inc. property on Summer Street in St. Johnsbury, Vermont (Figure 1). The report has been prepared by Ground Water of Vermont (GWV) for Mr. Henry Goss of the Goss Leasing Corporation, the current facility owner.

This site investigation was initiated under Vermont's Expressway notification process following the removal on 20 June 1996 of three abandoned 1,000-gallon gasoline underground storage tanks (USTs) that had apparently leaked into the subsurface. GWV informed Ms. Susan Thayer of the Vermont Department of Environmental Conservation (VT DEC) in its UST Closure Report dated 20 June 1996 that a site investigation was warranted given the presence of ground-water contamination in the tank excavation.

1.1 Site Location and Physical Setting

The site is located at the corner of Summer and Central streets near the downtown area of St. Johnsbury, Vermont, in a combined commercial/residential section of the city (Figure 1). The majority of the three-story building is constructed on a sub-grade granite/stone foundation.

The nearest surface-water body, Sleepers River, is approximately 3/8 mile west of the property. The Passumpsic River is located 1/2 mile east of the site. Presumed regional surface drainage and ground-water flow are toward the south.

Native surficial materials at the site are mapped as littoral (shoreline) sediments, which are predominantly well-sorted sands (Stewart and MacClintock, 1970). Bedrock underlying the site is mapped as Waits River Formation (Doll, 1961), which consists of gray quartzose and micaceous crystalline limestone that weathers to a distinctive brown earthy crust.

1.2 Site History

The approximately 1-acre site and 220 x 160 foot building are currently owned by Goss Leasing Corporation of Shelburne, Vermont. The building is occupied by the main Gossco, Inc. offices, the Gossco tire re-treading facility, Mayo's Glass Service and leased office space for Northeast Employment and Training Organization (N.E.T.O.).

The original portion of the building was reportedly built around 1907 and has subsequently undergone several additions. In addition to the current on-site activities, portions of the site have been previously utilized by an automotive dealership, a vehicle storage area, a gasoline station, and an automobile maintenance garage. The three gasoline USTs were reportedly taken out of service twenty to thirty years ago when the gasoline station closed.

The USTs consisted of three unregistered single-walled steel 1,000-gallon tanks. The tank cluster lay approximately five feet from the eastern edge of Summer Street within a concrete-surfaced service/parking area. The pump island had previously been removed and paved over. At-grade fill ports, vent lines and subsurface piping assemblies were still present, however.

The USTs were removed from the ground in the presence of GWV personnel on 20 June 1996, at which time evidence was observed of leakage from at least one of the USTs. The tank was found to have holes, and soils around the USTs had extensive petroleum staining and odors. Photoionization detector (PID) readings on some soil samples collected from the tank excavations exceeded 2,000 parts per million (ppm), and averaged approximately 139 ppm. Ground water, encountered at a depth of thirteen feet, appeared to be contaminated, although free-phase petroleum product was not observed. Native soils beneath the water table consisted of fine-to-medium sand and gravel.

The tanks were found to be in fair to poor condition upon removal. All USTs had heavy rust and pitting; a 1/8" by 1/2" corrosion hole was observed in the bottom surface of one UST. Several weep areas were observed in the bottom of an additional UST. Associated piping for all USTs was noted to be rusted and in fair condition. All excavated soils were backfilled.

1.3 Purpose and Scope of Work

The purposes of this initial site investigation were to:

- Evaluate the degree and extent of soil and ground-water contamination at the site;
- Qualitatively assess the risks to the environment and human health by identifying all relevant sensitive receptors and potential contaminant migration pathways;
- Identify potentially appropriate remedial actions based on the site conditions; and
- Provide preliminary recommendations for future action.

To accomplish these objectives, GWV has:

- Reviewed existing historical site data;
- Supervised the installation of four monitoring wells and determined the local ground-water flow direction and gradient;
- Collected and submitted for laboratory analysis ground-water samples from the four monitoring wells;
- Identified sensitive receptors in the area; and assessed the risk posed by the contamination to these potential receptors;
- Evaluated the need for treatment and/or a monitoring plan for the site; and
- Prepared this summary report, which details the work performed, qualitatively assesses risks, provides conclusions and offers recommendations for further action.

2.0 INVESTIGATIVE PROCEDURES AND RESULTS

2.1 Monitoring Well Installation

On 1 July 1996, GWV supervised the installation of four monitoring wells at the site (MW-1, MW-2, MW-3 and MW-4). MW-1 and MW-3 were placed in the former tank location and pump island areas, respectively. MW-4 was placed in an area presumed to be hydraulically downgradient from the former USTs, while MW-2 was sited to be cross-gradient as suggested by surrounding surface topography and waterway locations. Approximate well locations are shown on Figure 2. The monitoring wells were installed by Adams Engineering of Underhill, Vermont using vibratory drilling techniques to both advance the borings and emplace the wells.

Monitoring well borings were completed to a depth of 15 feet for MW-1, 20 feet for MW-2, 17 feet for MW-3 and 25 feet for MW-4. Continuous soil samples were collected at each monitoring-well boring location using a five-foot polyethylene-lined core barrel with a 2.375-inch inner diameter. The core barrel, which also served as the drill bit with an outer diameter of 4.0 inches, was simultaneously pushed and vibrated into place to advance the boring. The sample cores obtained were screened for the presence of volatile organic compounds (VOCs) with a photoionization detector (PID) and logged for lithology by GWV personnel. All downhole drilling equipment was decontaminated and the polyethylene core barrel liner changed between borings. The PID soil screening results are discussed in Section 2.2 below.

The unconsolidated overburden encountered in each boring generally consisted, from the ground surface down, of six to nine feet of poorly-sorted brown sand and gravel, three to six feet of fine gray-brown sand, and at least three to ten feet of high-plasticity gray clay with moist lenses. Soil samples collected from the MW-2 boring had a distinct weathered petroleum odor, and showed evidence of significant petroleum staining. Strong gasoline odors of an apparently more recent origin were noted in MW-1 and MW-3. Detailed stratigraphic soil descriptions are included on the boring/well logs in Appendix B. Bedrock was not encountered in any of the borings.

Ground water was encountered in all of the borings at depths ranging from seven to fifteen feet below ground surface. A monitoring well was installed in each soil boring by vibrating a two-inch diameter PVC well point into the open hole left by the core barrel. A 10-15 foot section of 0.010-inch slot high-flow screen was placed such that approximately 5-10 feet of screen extended above the apparent water table. Solid two-inch diameter PVC riser extended from the top of screen to approximately 0.5 feet below ground surface. Clean quartz #1 filter sand was placed in any open annulus around the well to at least one foot above the top of the screened interval. A bentonite seal at least one foot thick was installed above the sand pack and the remainder of the annular space was filled with native material. Each completed monitoring well was protected by a flush-mounted steel roadbox that was cemented in place. Monitoring-well construction details are included on the boring/well logs in Appendix B.

~~Wells MW-1 and MW-3 were developed immediately after construction using a peristaltic pump. Wells MW-2 and MW-4 were developed on the day of sampling, using a hand bailer.~~ Development water was discharged to the ground surface in the vicinity of each well.

2.2 Subsurface Soil Screening Results

Soil headspace screening for the presence of volatile organic compounds (VOCs) was conducted in the field on samples from discrete depth intervals throughout each boring using a Photovac TIP II PID calibrated with isobutylene gas to a benzene reference. Readings ranged from 0.0 ppm in samples collected from MW-4 to 359 ppm in a sample taken from MW-1 (former pump island) near the water-table surface. PID screening results are included on the boring logs in Appendix B.

2.3 Determination of Ground-Water Flow Direction and Gradient

Fluid levels were measured in all four of the site monitoring wells on 9 July 1996. The wells were resurveyed on July 30 in order to confirm the initial survey data. Water-table elevations were computed for each monitoring well by subtracting the measured depth-to-water readings from the surveyed top-of-casing elevations, which are relative to an arbitrary 100.00-foot datum. Water-level measurements and elevation calculations for 9 July 1996 are presented in Table 1. The ground-water contour map in Figure 3 was prepared using this data.

Ground water in the unconfined surficial aquifer beneath the site appears to be flowing eastward, rather than the southward direction that had been presumed. The average ground-water gradient was about 17%.

2.4 Ground-Water Sampling and Analysis

Gasoline compounds were detected above regulatory standards in all three of the wells located in the parking lot, near the former USTs and pump island (MW-1 - MW-3). The monitoring well in the former UST location (MW-3) showed the highest total BTEX concentration (63,950 ppb). The monitoring well located in the former pump island location (MW-1) showed only slightly lower levels (53,569 ppb) of BTEX compounds. The monitoring well located approximately 30 feet directly downgradient of these wells (MW-2) showed lower total BTEX concentrations (26,980 ppb), but still significantly exceeded all of the VGESs for these compounds. Gasoline compounds were also detected at low levels in the well located along Central Street (MW-4), but these levels may represent low-level contamination occurring during the sample collection, transport and analytical process. Analytical results for all the samples are summarized in Table 2. A contaminant distribution map of BTEX and MTBE is presented as Figure 4. Laboratory report forms are included in Appendix C.

Except for an absence of benzene in MW-1, all of the gasoline compounds benzene, toluene, ethylbenzene and xylenes (collectively termed "BTEX") were detected at levels exceeding Vermont Groundwater Enforcement Standards¹ in MW-1, MW-2 and MW-3. Although benzene was not detected in MW-3, this result may have been due to the large dilution required by very high xylene levels, which increased the benzene detection limit for this sample to 1,000 ppb (200 times the VGES).

In the trip-blank QA/QC sample, toluene was detected at a concentration of 1.4 ppb, ethylbenzene at 1.1 ppb and xylenes at 3.8 ppb. The trip blank had been collected from a newly-opened gallon bottle of commercially-available distilled water prior to going into the field, and had remained in the cooler throughout the sample collection and transport process. GWV's review of possible causes of this result suggests that the water probably became contaminated before the bottle was opened. Low levels of contamination have periodically appeared in trip-blank samples, and previous investigations have generally concluded that the contaminants migrated through the low-density polyethylene (LDPE) container during storage and transport of the water prior to retail sale. Nevertheless, the presence of contamination at similar levels in one of the monitoring wells (MW-4) suggests that it is possible that the samples became slightly contaminated at some point in the sample collection, transport, or analytical process.

Ground-water samples were collected from all four on-site monitoring wells on 9 July 1996. Each monitoring well was purged prior to sampling using a new disposable bailer and dropline, which were then used to collect the sample and left in the well for future sample collection. Recharge rates observed in all the wells during development and pre-sample purging were slow.

Trip blank and duplicate samples were collected to ensure that adequate quality assurance/quality control (QA/QC) standards were maintained. All field procedures were conducted in accordance with GWV standard protocols.

All samples were placed in an ice-filled cooler and transported under chain-of-custody to a Vermont certified analytical laboratory, where they were tested for the presence of the regulated gasoline compounds benzene, toluene, ethyl benzene, and xylenes (collectively termed "BTEX") and for the gasoline additive methyl-tertiary butyl-ether (MTBE) by EPA Method 8020.

Analytical results for the 9 July duplicate sample were within 9 percent or less of the original sample results for all identified compounds.

¹ The State of Vermont has established Vermont ground-water enforcement standards (VGESs) for the BTEX compounds, with maximum levels as follows: benzene- 5 parts per billion, or ppb; toluene- 2,420 ppb; ethyl benzene- 680 ppb; xylenes- 400 ppb.

3.0 SENSITIVE RECEPTOR SURVEY AND RISK ASSESSMENT

GWV conducted a survey to identify potentially-impacted sensitive receptors near the site and evaluated their potential to be impacted by the soil and ground-water contamination identified at the site. Our findings are discussed below.

- The on-site building and all nearby dwellings are served by the municipal water system. St. Johnsbury's water supply is obtained from the Stiles Pond Reservoir, which is located approximately four miles east of the site and is thus unlikely to be threatened by the contamination detected at the site.
- Buried utilities (water and wastewater/stormwater collection systems) are located along the eastern edge of Summer Street in the immediate vicinity of the former UST locations. An inspection of nearby storm-drain culverts revealed no qualitative evidence of gasoline-compound contamination emanating from the site through this potential preferential pathway for contaminant migration.
- Portions of the on-site building immediately east and south of the former tank locations (and in the direction of ground-water flow) have a subsurface stone foundation, and the concrete floor is extremely cracked, so it is possible that gasoline vapors could impact indoor air quality. Ground-water data at the site suggest that the area of ground-water contamination has extended beyond the immediate area of the former UST location, presumably beneath the existing on-site structure. No elevated PID readings were observed in portions of the building basement during a 20 June 1996 screening, however.
- Several off-site buildings, including a church and private homes are located east and downgradient of the on-site building. Because the lateral extent of contaminant migration is unknown, the risk posed to these buildings cannot be completely evaluated. All of these buildings are located at least 200 feet from the probable source areas, so the likelihood of vapor impact is low.
- A site walkthrough revealed no evidence of ground-water seeps near surrounding buildings or grass exposures.
- The nearest surface-water body is Sleepers River, located approximately 3/8 mile west of the property. Water quality in the Sleepers River is not considered threatened, because ground-water in the shallow aquifer at the site flows toward the east, away from this river.
- The Passumpsic River, located 1/2 mile east of the site, is the nearest downgradient surface-water body. Although the Passumpsic River likely represents the eventual surface discharge point of the ground water flowing beneath the site, the fine-grained nature of the saturated soils suggests that ground-water velocities will be slow, and that the natural processes of dilution, dispersion and biodegradation will prevent the discharge of detectable levels of gasoline compounds to this river.
- PID soil screening data from the UST excavations and monitoring-well borings suggest that the area of significant soil contamination is limited to the immediate vicinity of the former UST and pump island locations. This area is surfaced with concrete or asphalt, which limits the potential for direct public exposure to contaminated soils.

In summary, available evidence suggests that residual subsurface contamination associated with the former leaking UST does not appear to pose a significant immediate threat to any nearby sensitive receptors. The risk of vapor entry into the on-site building and other downgradient buildings has not been adequately evaluated, however.

4.0 CONCLUSIONS

Based on the results of the site investigation described above, Ground Water of Vermont concludes the following:

1. Gasoline has been released to soil and ground water in the vicinity of three 1,000-gallon gasoline USTs, which were removed from the ground on 20 June 1996, and in the vicinity of a nearby former gasoline pump island. No other USTs are known to exist on the property.
2. The absence of the gasoline additive MTBE in the monitoring well samples suggests that the gasoline releases were not recent.
3. The downgradient extent of ground-water contamination has not been determined. Vermont Groundwater Enforcement Standards were significantly exceeded for all BTEX compounds in the farthest directly downgradient monitoring well (MW-2).
4. Surficial materials at the site generally consist of six to fifteen feet of sand or sand and gravel, underlain by damp, gray clay. Ground water was present during the 9 July 1996 sampling event at depths ranging from 7 to 15 feet below ground surface, and was flowing east at an average gradient of approximately 17%.
5. The residual contamination in soil and ground water does not appear to pose an imminent threat to the environmental or to public health. The site and all surrounding properties are served by municipal water, which is obtained from a reservoir located approximately four miles away. The risk of vapor entry to nearby buildings is considered low, but has not yet been adequately evaluated. The fine-grained nature of soils in the surficial aquifer beneath the site, together with the fact that the nearest downgradient surface-water body is located approximately 1/2 mile away, suggest that the risk of impact to surface water quality is also low.

5.0 RECOMMENDATIONS

On the basis of the findings reached during this investigation, Ground Water of Vermont makes the following recommendations:

1. In order to determine the downgradient extent of ground-water contamination, one additional downgradient ground-water monitoring well should be installed along the eastern edge of the on-site building, near the Methodist church.
2. Contaminant concentrations and ground-water elevations in the four existing on-site wells and additional proposed well should be monitored quarterly for one year.
3. The results of the first year's quarterly monitoring program should be used to evaluate the need for additional investigation and/or continued ground-water monitoring at the site.
4. The basement of the on-site building and any other downgradient buildings that appear to be threatened should be screened with a photoionization detector during each sampling event.

6.0 REFERENCES

- Doll, C.G. and others, 1961. *Geologic Map of Vermont*, Office of the State Geologist.
- Fetter, C.W., 1994. *Applied Hydrogeology, 3rd Ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 691 p.
- Domenico, P.A., and Schwartz, F.W., 1990. *Physical and Chemical Hydrogeology*, John Wiley and Sons, New York, 824 p.
- Stewart, D.P. and P. MacClintock, 1970. *Surficial Geologic Map of Vermont*, Office of the State Geologist.

APPENDIX A

Figures and Tables

SUMMER STREET



Sidewalk

HIGH DRIVE DOWN

HIGH DRIVE UP

MW-3

MW-1

Former Pump
Island

3 - Former 1K
Gas USTs

MW-2

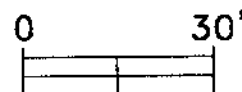
MW-4

RESIDENTIAL

GOSS BUILDING

METHODIST CHURCH

CENTRAL STREET



SCALE

ALL LOCATIONS ARE APPROXIMATE



Ground Water of Vermont

1 Mill St., Box C-5
Burlington, VT 05401
(802) 860-6065

GOSS LEASING CORP. PROPERTY
ST. JOHNSBURY, VT

FIGURE 2.
SITE MAP
WITH MONITORING WELL LOCATIONS

LEGEND:

● MONITORING WELL

DRAWN BY: STE

DATE: AUG 1996

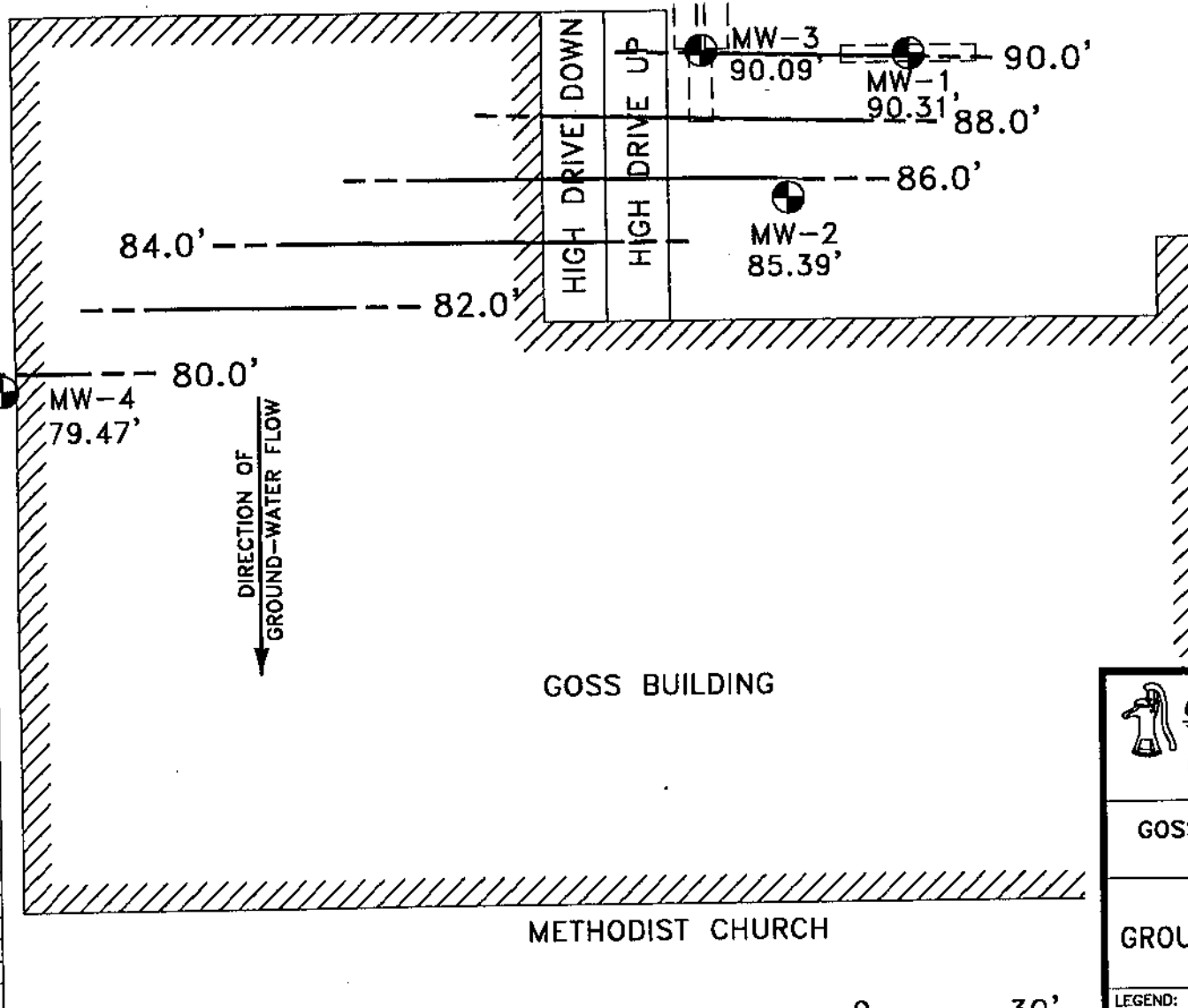
APPROVED BY: RM

FILE No.: 96048

SUMMER STREET



CENTRAL STREET



GOSS BUILDING

METHODIST CHURCH

RESIDENTIAL



SCALE

ALL LOCATIONS ARE APPROXIMATE



Ground Water of Vermont

1 Mill St., Box C-5
Burlington, VT 05401
(802) 860-6065

GOSS LEASING CORP. PROPERTY
ST. JOHNSBURY, VT

FIGURE 3.
GROUND-WATER CONTOUR MAP
MONITORING DATE: 9 JULY 1996

LEGEND: — GROUND-WATER CONTOUR
● MONITORING WELL

DRAWN BY: STE	DATE: AUG 1996
APPROVED BY: RM	FILE No.: 96048

SUMMER STREET



CENTRAL STREET

HIGH DRIVE DOWN

HIGH DRIVE UP

RESIDENTIAL

MW-4

4.1 ppb BTEX
ND<1 ppb MTBE

163,950 ppb BTEX

MW-3

ND<1000 ppb MTBE

50,000

MW-2

26,980 ppb BTEX
ND<200 ppb MTBE

53,569 ppb BTEX
ND<200 ppb MTBE

MW-1

10,000

GOSS BUILDING

METHODIST CHURCH



SCALE

ALL LOCATIONS ARE APPROXIMATE



Ground Water of Vermont

1 Mill St., Box C-5
Burlington, VT 05401
(802) 860-6065

GOSS LEASING CORP. PROPERTY
ST. JOHNSBURY, VT

FIGURE 4.
CONTAMINANT DISTRIBUTION MAP
MONITORING DATE: 17 JUNE 1996

LEGEND: — BTEX + MTBE CONTOUR
● MONITORING WELL

DRAWN BY: STE	DATE: AUG 1996
APPROVED BY: RM	FILE No.: 96048

TABLE 1. GROUND-WATER ELEVATION CALCULATIONS

**Goss Leasing Corp. Property
St. Johnsbury, VT**

Monitoring Date: 9 July 1996

Well I.D.	Top of Casing Elevation	Depth to Water	Water Table Elevation
MW-1	99.98	9.67	90.31
MW-2	100.00	14.61	85.39
MW-3	99.52	9.43	90.09
MW-4	98.91	19.44	79.47

All values reported in feet relative to arbitrary datum.

TABLE 2. ANALYTICAL RESULTS - 9 JULY 1996

**Goss Leasing Corp. Property
St. Johnsbury, VT**

Location	Benzene	Toluene	Ethyl benzene	Xylenes	Total BTEX	MTBE
MW-1	689	24,100	3,680	25,100	53,569	ND <200
MW-2	1,840	10,700	1,640	12,800	26,980	ND <200
MW-3	ND <1000	7,930	7,820	48,200	63,950	ND <1000
MW-4	ND <1	1.0	1.2	1.9	4.1	ND <1
VGES	5	2,420	680	400	—	40

Notes: Results given in parts per billion (ppb), unless noted otherwise.

ND: None detected at indicated detection limit.

VGES: Vermont Groundwater Enforcement Standards

APPENDIX B

Boring Logs



Ground Water of Vermont

FIELD SUPERVISOR Brian Storer
CONTRACTOR Adams Engineering
DRILLERS J. Adams

JOB LOCATION Goss Co.

DATE 7/1/96

DRILLING METHOD

Vibratory

BORING DIAMETER 2.375"

AND 40 - 50%
SOME 10 - 40%
TRACE 0 - 10%

BORING LOCATION

BORING

sketch on back or on-site plan
with measurements

MW-2

TOTAL DEPTH

20'

DEPTH	SAMPLES SAMPLE NUMBER	BLOWS PER 6"	REG.	SAMPLE DESCRIPTION	STRAT CHG	P10 Readings in ppm GENERAL DESCRIPTION ppm = parts per million	WELL DETAIL	DEPTH
	0	6	12	18	24			
						dry 0.0 ppm		
				medium to fine drk brown sand and gravel				
				fine light brown sand		dry 0.6 ppm		
5'			3.0	↓				5'
				medium brown sand		1.2 ppm		
				silty gray clay		~ water table		
10'			3.0	↓		wet weathered 1.0 ppm gasoline odor		10'
				gray clay		damp 1.1 ppm		
15'			3.0	↓		plastic-like 7.4 ppm		15'
						damp		
20'						10.6 ppm		20'
25'								25'
30'								30'
35'								35'
40'								40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	0.10" PVC	15'	GROUT	YES	
SLOT SIZE	2" PVC	15'	BACKFILL	YES	
RISER PIPE	2" PVC	5'	WATER USED	NO	
GRADED SAND	#1	3 gals	STEAM CLEANER	YES	
PELLET BENTONITE					
GRANULAR BENTONITE	YES	1 1/2 gallon			



Ground Water of Vermont

FIELD SUPERVISOR B. Storer
CONTRACTOR Adams Engineering
DRILLERS Jerry Adams

JOB LOCATION Goss Co.

DATE 7/1/96

DRILLING METHOD

vibratory

BORING DIAMETER

2.375"

AND 40 - 50%
SOME 10 - 40%
TRACE 0 - 10%

BORING LOCATION

BORING #

sketch on back or on site plus
with measurements

mw-3

TOTAL DEPTH

17'

DEPT. SAMPLES SAMPLE NUMBER BLOWS PER 6"

0 6 12 18 24

REC.

SAMPLE DESCRIPTION

STRAT
CHG

P.O. Readings in ppm
GENERAL DESCRIPTION
ppm = parts per million

WELL
DETAIL

DEPTH

5'

10'

15'

20'

25'

30'

35'

40'

6.0

medium to fine dark
brown sand and gravel

4.5

5.0

medium to fine dark
brown to gray sand

2.5

gray clay

4.8 ppm
excavation backfill
strong gasoline odor

196 ppm

strong gasoline odor
~ ground water table

181 ppm

74.6 ppm
plastic-like
122 ppm

riser
screen
native soil

5'

10'

15'

20'

25'

30'

35'

40'

MATERIALS USED

SIZE/TYPE

QUANTITY

MATERIALS USED

SIZE/TYPE

QUANTITY

WELL SCREEN

0.10"/PVC

10'

GROUT

yes

SLOT SIZE

2"/PVC

10'

BACKFILL

yes

RISER PIPE

2"/PVC

7'

WATER USED

no

GRADED SAND

#1

2 gallons

STEAM CLEANER

yes

PELLET BENTONITE

yes

1/2 gallon



Ground Water of Vermont

FIELD SUPERVISOR Brian Storer
CONTRACTOR Adams Engineering
DRILLERS J. Adams

JOB LOCATION Goss Co.

DATE 7/1/96

DRILLING METHOD Vibratory

BORING DIAMETER 2.375"

AND 40 - 50%
SOME 10 - 40%
TRACE 0 - 10%

BORING LOCATION

BORING #

sketch on back or on site plan
with measurements

TOTAL DEPTH

25'

BLOWS PER 6"

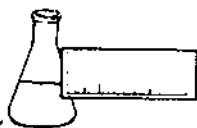
DEPTH	SAMPLES	SAMPLE NUMBER	0	6	12	18	24
			6	12	18	24	

REC.	SAMPLE DESCRIPTION	STRAT CHG	P10 Readings in ppm GENERAL DESCRIPTION ppm = parts per million	WELL DETAIL	DEPTH
3.5	black top + concrete poorly sorted brown sand		0.3 ppm		
5.0			dry		5'
2.5	fine light brown sand		0.1 ppm 0.0 ppm		10'
5.0			dry		15'
5.0	gray clay		0.0 ppm ground water table		20'
			plastic tile damp 0.0 ppm		25'
			damp		30'
			0.0 ppm		35'
	bottom				40'

MATERIALS USED	SIZE/TYPE	QUANTITY	MATERIALS USED	SIZE/TYPE	QUANTITY
WELL SCREEN	2" PVC	15'	GROUT	yes	
SLOT SIZE	0.10" PVC	15'	BACKFILL	yes	
RISER PIPE	2" PVC	5'	WATER USED	no	
GRADED SAND	#1	3 gallons	STEAM CLEANER	yes	
PELLET BENTONITE					
GRANULAR BENTONITE	yes	1 1/2 gallon			

APPENDIX C

Laboratory Report Forms



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: GroundWater of Vermont
PROJECT NAME: Goss Co.
REPORT DATE: July 16, 1996
DATE SAMPLED: July 9, 1996

PROJECT CODE: GWVT1367
REF.#: 91,132 - 91,137

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

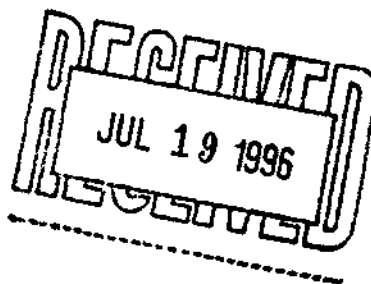
All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director



enclosures



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont
PROJECT NAME: Goss Co.
REPORT DATE: July 16, 1996
DATE SAMPLED: July 9, 1996
DATE RECEIVED: July 11, 1996
DATE ANALYZED: July 12, 1996

PROJECT CODE: GWVT1367
REF.#: 91,132
STATION: Trip Blank
TIME SAMPLED: 5:30
SAMPLER: Brian Starer

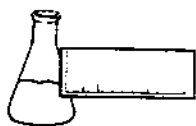
<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	1.1
Toluene	1	1.4
Xylenes	1	3.8
MTBE	1	ND

Bromobenzene Surrogate Recovery: 99%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected



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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont
PROJECT NAME: Goss Co.
REPORT DATE: July 16, 1996
DATE SAMPLED: July 9, 1996
DATE RECEIVED: July 11, 1996
DATE ANALYZED: July 12, 1996

PROJECT CODE: GWVT1367
REF.#: 91,133
STATION: MW-1
TIME SAMPLED: 17:00
SAMPLER: Brian Starer

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	200	689.
Chlorobenzene	200	ND ²
1,2-Dichlorobenzene	200	ND
1,3-Dichlorobenzene	200	ND
1,4-Dichlorobenzene	200	ND
Ethylbenzene	200	3,680.
Toluene	200	24,100.
Xylenes	200	25,100.
MTBE	200	ND

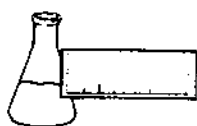
Bromobenzene Surrogate Recovery: 96%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at a 0.5% dilution.

2 None detected



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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont
PROJECT NAME: Goss Co.
REPORT DATE: July 16, 1996
DATE SAMPLED: July 9, 1996
DATE RECEIVED: July 11, 1996
DATE ANALYZED: July 15, 1996

PROJECT CODE: GWVT1367
REF.#: 91,134
STATION: MW-2
TIME SAMPLED: 16:45
SAMPLER: Brian Starer

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	200	1,840.
Chlorobenzene	200	ND ²
1,2-Dichlorobenzene	200	ND
1,3-Dichlorobenzene	200	ND
1,4-Dichlorobenzene	200	ND
Ethylbenzene	200	1,640.
Toluene	200	10,700.
Xylenes	200	12,800.
MTBE	200	ND

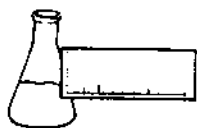
Bromobenzene Surrogate Recovery: 96%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at a 0.5% dilution.

2 None detected



ENDYNE, INC.

Laboratory Services

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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont
PROJECT NAME: Goss Co.
REPORT DATE: July 16, 1996
DATE SAMPLED: July 9, 1996
DATE RECEIVED: July 11, 1996
DATE ANALYZED: July 12, 1996

PROJECT CODE: GWVT1367
REF.#: 91,135
STATION: MW-3
TIME SAMPLED: 16:30
SAMPLER: Brian Starer

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	1000	ND ²
Chlorobenzene	1000	ND
1,2-Dichlorobenzene	1000	ND
1,3-Dichlorobenzene	1000	ND
1,4-Dichlorobenzene	1000	ND
Ethylbenzene	1000	7,820.
Toluene	1000	7,930.
Xylenes	1000	48,200.
MTBE	1000	ND

Bromobenzene Surrogate Recovery: 94%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at a 0.1% dilution.

2 None detected



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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont
PROJECT NAME: Goss Co.
REPORT DATE: July 16, 1996
DATE SAMPLED: July 9, 1996
DATE RECEIVED: July 11, 1996
DATE ANALYZED: July 15, 1996

PROJECT CODE: GWVT1367
REF.#: 91,136
STATION: MW-4
TIME SAMPLED: 16:15
SAMPLER: Brian Starer

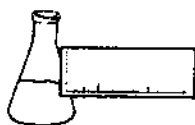
<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	1.2
Toluene	1	1.0
Xylenes	1	1.9
MTBE	1	ND

Bromobenzene Surrogate Recovery: 100%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected



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LABORATORY REPORT

EPA METHOD 8020--PURGEABLE AROMATICS

CLIENT: GroundWater of Vermont
PROJECT NAME: Goss Co.
REPORT DATE: July 16, 1996
DATE SAMPLED: July 9, 1996
DATE RECEIVED: July 11, 1996
DATE ANALYZED: July 16, 1996

PROJECT CODE: GWVT1367
REF.#: 91,137
STATION: Duplicate
TIME SAMPLED: Not Indicated
SAMPLER: Brian Starer

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	200	626.
Chlorobenzene	200	ND ¹
1,2-Dichlorobenzene	200	ND
1,3-Dichlorobenzene	200	ND
1,4-Dichlorobenzene	200	ND
Ethylbenzene	200	3,670.
Toluene	200	24,300.
Xylenes	200	25,200.
MTBE	200	ND

Bromobenzene Surrogate Recovery: 95%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at a 0.5% dilution.

2 None detected



GroundWater of Vermont

The Chace Mill, One Mill Street, Box C-5, Burlington, Vermont, 05401
(802)-860-6065 (802)-860-6076 Fax

CHAIN OF CUSTODY RECORD

LABORATORY

ANALYSIS STATUS:

☐ RUSH (2-DAY)
☐ PRIORITY (4-DAY)
☒ BEST AVAILABLE TIME

PROJECT NUMBER: 096-047

PROJECT NAME: 6055 Co

PROJECT LOCATION: St Johnsbury, VT

PROJECT MANAGER: Ben Miller

COLLECTED BY: Brian Stone

DATE: 7/9/96

ANALYSIS REQUESTED

METALS - PLEASE LIST: NA () EP-TOX () (P)

CL & GREASE: IR () GRAV. ()

VOLATILE ORGANICS: 624 () 607 () 602 ()
8010 () 8015 () 8020/21/22/23/24/25/26/27/28/29/30/31/32/33/34/35/36/37/38/39/40/41/42/43/44/45/46/47/48/49/50/51/52/53/54/55/56/57/58/59/60/61/62/63/64/65/66/67/68/69/70/71/72/73/74/75/76/77/78/79/80/81/82/83/84/85/86/87/88/89/90/91/92/93/94/95/96/97/98/99/100/101/102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/120/121/122/123/124/125/126/127/128/129/130/131/132/133/134/135/136/137/138/139/140/141/142/143/144/145/146/147/148/149/150/151/152/153/154/155/156/157/158/159/160/161/162/163/164/165/166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500/501/502/503/504/505/506/507/508/509/510/511/512/513/514/515/516/517/518/519/520/521/522/523/524/525/526/527/528/529/530/531/532/533/534/535/536/537/538/539/540/541/542/543/544/545/546/547/548/549/550/551/552/553/554/555/556/557/558/559/560/561/562/563/564/565/566/567/568/569/570/571/572/573/574/575/576/577/578/579/580/581/582/583/584/585/586/587/588/589/590/591/592/593/594/595/596/597/598/599/600/601/602/603/604/605/606/607/608/609/610/611/612/613/614/615/616/617/618/619/620/621/622/623/624/625/626/627/628/629/630/631/632/633/634/635/636/637/638/639/640/641/642/643/644/645/646/647/648/649/650/651/652/653/654/655/656/657/658/659/660/661/662/663/664/665/666/667/668/669/670/671/672/673/674/675/676/677/678/679/680/681/682/683/684/685/686/687/688/689/690/691/692/693/694/695/696/697/698/699/700/701/702/703/704/705/706/707/708/709/710/711/712/713/714/715/716/717/718/719/720/721/722/723/724/725/726/727/728/729/730/731/732/733/734/735/736/737/738/739/740/741/742/743/744/745/746/747/748/749/750/751/752/753/754/755/756/757/758/759/760/761/762/763/764/765/766/767/768/769/770/771/772/773/774/775/776/777/778/779/780/781/782/783/784/785/786/787/788/789/790/791/792/793/794/795/796/797/798/799/800/801/802/803/804/805/806/807/808/809/810/811/812/813/814/815/816/817/818/819/820/821/822/823/824/825/826/827/828/829/830/831/832/833/834/835/836/837/838/839/840/841/842/843/844/845/846/847/848/849/850/851/852/853/854/855/856/857/858/859/860/861/862/863/864/865/866/867/868/869/870/871/872/873/874/875/876/877/878/879/880/881/882/883/884/885/886/887/888/889/890/891/892/893/894/895/896/897/898/899/900/901/902/903/904/905/906/907/908/909/910/911/912/913/914/915/916/917/918/919/920/921/922/923/924/925/926/927/928/929/930/931/932/933/934/935/936/937/938/939/940/941/942/943/944/945/946/947/948/949/950/951/952/953/954/955/956/957/958/959/960/961/962/963/964/965/966/967/968/969/970/971/972/973/974/975/976/977/978/979/980/981/982/983/984/985/986/987/988/989/990/991/992/993/994/995/996/997/998/999/1000/1001/1002/1003/1004/1005/1006/1007/1008/1009/1010/1011/1012/1013/1014/1015/1016/1017/1018/1019/1020/1021/1022/1023/1024/1025/1026/1027/1028/1029/1030/1031/1032/1033/1034/1035/1036/1037/1038/1039/1040/1041/1042/1043/1044/1045/1046/1047/1048/1049/1050/1051/1052/1053/1054/1055/1056/1057/1058/1059/1060/1061/1062/1063/1064/1065/1066/1067/1068/1069/1070/1071/1072/1073/1074/1075/1076/1077/1078/1079/1080/1081/1082/1083/1084/1085/1086/1087/1088/1089/1090/1091/1092/1093/1094/1095/1096/1097/1098/1099/1100/1101/1102/1103/1104/1105/1106/1107/1108/1109/1110/1111/1112/1113/1114/1115/1116/1117/1118/1119/1120/1121/1122/1123/1124/1125/1126/1127/1128/1129/1130/1131/1132/1133/1134/1135/1136/1137/1138/1139/1140/1141/1142/1143/1144/1145/1146/1147/1148/1149/1150/1151/1152/1153/1154/1155/1156/1157/1158/1159/1160/1161/1162/1163/1164/1165/1166/1167/1168/1169/1170/1171/1172/1173/1174/1175/1176/1177/1178/1179/1180/1181/1182/1183/1184/1185/1186/1187/1188/1189/1190/1191/1192/1193/1194/1195/1196/1197/1198/1199/1200/1201/1202/1203/1204/1205/1206/1207/1208/1209/1210/1211/1212/1213/1214/1215/1216/1217/1218/1219/1220/1221/1222/1223/1224/1225/1226/1227/1228/1229/1230/123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The Chace Mill, One Mill Street, Box C-5, Burlington, Vermont, 05401
(802)-860-6065 (802)-860-6076 Fax

CHAIN OF CUSTODY RECORD

LABORATORY

PROJECT NUMBER: V96-047

PROJECT NAME: GOSS CO

PROJECT LOCATION: St Johnsbury, VT

PROJECT MANAGER: Bon Miller

COLLECTED BY: Brian Stone

DATE: 7/9/96

ANALYSIS STATUS:

RUSH (2-DAY)

PRIORITY (4-DAY)

BEST AVAILABLE TIME

ANALYSIS REQUESTED

MATRIX

W = AQUEOUS
S = SOLIDS

PRESERVATIVE

1 = ICED

A = ACIDIFIED () : / HCl 7 drops

B = BASE

N = SODIUM BISULFATE

RELINQUISHED BY

DATE _____

TIME

RECEIVED BY

7/19/96

9:30

Love Bean